

April 28, 2006



just the **FACTs**

This fact sheet is provided as a reference to encourage a greater understanding of the various issues related to managing water in south Florida.

Herbert Hoover Dike

Analysis Report Findings and Recommendations

As the government agency responsible for flood control in South Florida, the South Florida Water Management District vigilantly monitors the structures and canals that provide the region's flood protection. This includes attention to Lake Okeechobee, its surrounding dike and the regulatory schedule used by the U.S. Army Corps of Engineers for managing the lake.

In 2004 and 2005, heavy seasonal rainfall and multiple hurricanes caused extensive and serious impacts on Lake Okeechobee. Following Hurricane Wilma in 2005, the lake rose to a threatening 17.2 feet, and large freshwater releases to tide were required to protect people and property from potential flooding. Despite the storms' adverse effects, these conditions also provided valuable opportunities to collect data on the lake's response to high water levels, high winds and wind-driven waves.

In the interest of public safety, the Governing Board of the South Florida Water Management District commissioned **an independent, expert review panel to evaluate the 140 mile-long Herbert Hoover Dike surrounding Lake Okeechobee.** The purpose of the study was to evaluate the integrity of the dike, assessing the 1999 dike analysis performed by the U.S. Army Corps of Engineers and integrating new storm data about the lake. The broader goal was to identify potential problems and ways to address them, helping public agencies to prevent crisis conditions instead of responding to them.

Expert Review Panel

Three widely recognized experts in dam safety and geotechnical analysis were assembled to provide an independent review of the 1999 analysis performed by the U.S. Army Corps of Engineers on Lake Okeechobee and the stability of the Herbert Hoover Dike.

Leslie G. Bromwell, Sc.D., P.E. is an expert on earth structures and foundations. A Professional Engineer registered in nine states, he has represented industrial clients, government agencies, contractors and architects in a wide range of environmental and geotechnical issues. He has served on consulting boards and task forces for the U.S. Army Corps of Engineers, NASA and the State of Florida. Dr. Bromwell served on the faculty of the Massachusetts Institute of Technology and is currently Director and Principal Engineer for BCI Engineers & Scientists, Inc., in Lakeland, FL.

Robert G. Dean, Sc.D., P.E. is a Graduate Research Professor of Coastal and Oceanographic Engineering at the University of Florida, where he has served on the faculty for 25 years. He is an expert in hydraulics and water wave monitoring and holds a U.S. Patent in this field.

Steven G. Vick, P.E. specializes in dam safety, risk analysis and geotechnical engineering. He has provided expert review on dams and dam safety to government and industrial clients in the United States, Canada, Europe, South America and the Pacific Rim.



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Report Findings

- **The Herbert Hoover Dike as constructed today does not meet current dam safety criteria. Of primary concern is seepage-related erosion.** While seepage is inherent in any dam structure, seepage containing structural material, such as sand or soil, is a sign of erosion and technically means the dam is failing. Depending on the degree of erosion, a portion of the dam could potentially fail.
- Since the dike's construction in the 1930s and upgrading in the 1960s, the U.S. Army Corps of Engineers has closely monitored seepage and has been successful in repairing minor erosion sites that have appeared, including emergency repairs needed immediately after any storm impacts. This approach cannot succeed indefinitely. Florida's porous geologic formations coupled with its sand- and silt-type soils provide for continuous water seepage and ongoing erosion of the dike's structural integrity.
- **Seepage, erosion and overtopping of the dike increase when the lake level is high and when wind-driven waves impact the dike's earthen structures.** In 2004 and 2005, high rainfall and multiple hurricanes produced both of these conditions. Efforts by the U.S. Army Corps of Engineers, particularly during and immediately after storm events, successfully kept the dike intact. Follow-up repairs and rehabilitation are ongoing.
- **The current "slurry wall" repairs are not adequate to address the seepage problems** or to ensure stability of the dike.
- **The rehabilitation schedule is not sufficient to address the current probability of dike failure.** The erosion rate and the number of locations where erosion is occurring are a public safety concern. Remedial repairs, while helpful, will not adequately correct the long-term decline of the dike. If not addressed, the likelihood of multiple breaches will continue to increase over time.

Recommendations

Recommendations to the U.S. Army Corps of Engineers:

- **Seek the necessary Congressional authorization to improve the dike to dam standards.** Although the Herbert Hoover Dike was not built as a dam, it was recently reclassified as a dam and added to the federal National Inventory of Dams. Different hurricane criteria are involved with this new classification. The dike does not have the authorization by Congress to be improved to dam standards.
- **Fast-track critical and extensive repairs to the dike.** Improvements to the dike are essential for protecting those communities surrounding Lake Okeechobee. Accelerating the timeline for these improvements is critical.
- **Develop engineering solutions to adequately protect the dike against wave action, storm surges and seepage-related erosion.** This includes new criteria for dike inspections and modifications in the design of repairs currently being implemented.



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Recommendations (continued)

Recommendations to the U.S. Army Corps of Engineers:

- **Modify the Lake Okeechobee regulatory schedule to lower the lake level until seepage repairs are complete.** This will decrease the risk of erosion-induced failures and also allow repairs to be implemented on an accelerated schedule.
- Position adequate materials and equipment before the start of hurricane season on June 1 to immediately respond to any storm-related dike damage and promptly implement seepage repairs.

In Addition:

- The Florida Division of Emergency Management is being asked to re-evaluate the flood inundation maps for Lake Okeechobee prepared following the Corps' analysis of the dike in 1999, in order to better delineate areas currently susceptible to flood impacts.
- **Local and county governments are asked to work closely with the Florida Division of Emergency Management to update emergency preparations and evacuation plans based on this new information.** A well-rehearsed plan for bringing citizens out of harm's way continues to be an essential component of responsible flood protection.
- Continued state and local support for implementing *Acceler8* projects will supplement rehabilitation and emergency preparedness plans. These Everglades Restoration projects provide significant water storage, aid in local flood protection and improve management of water levels in the lake.



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